FLIGHT

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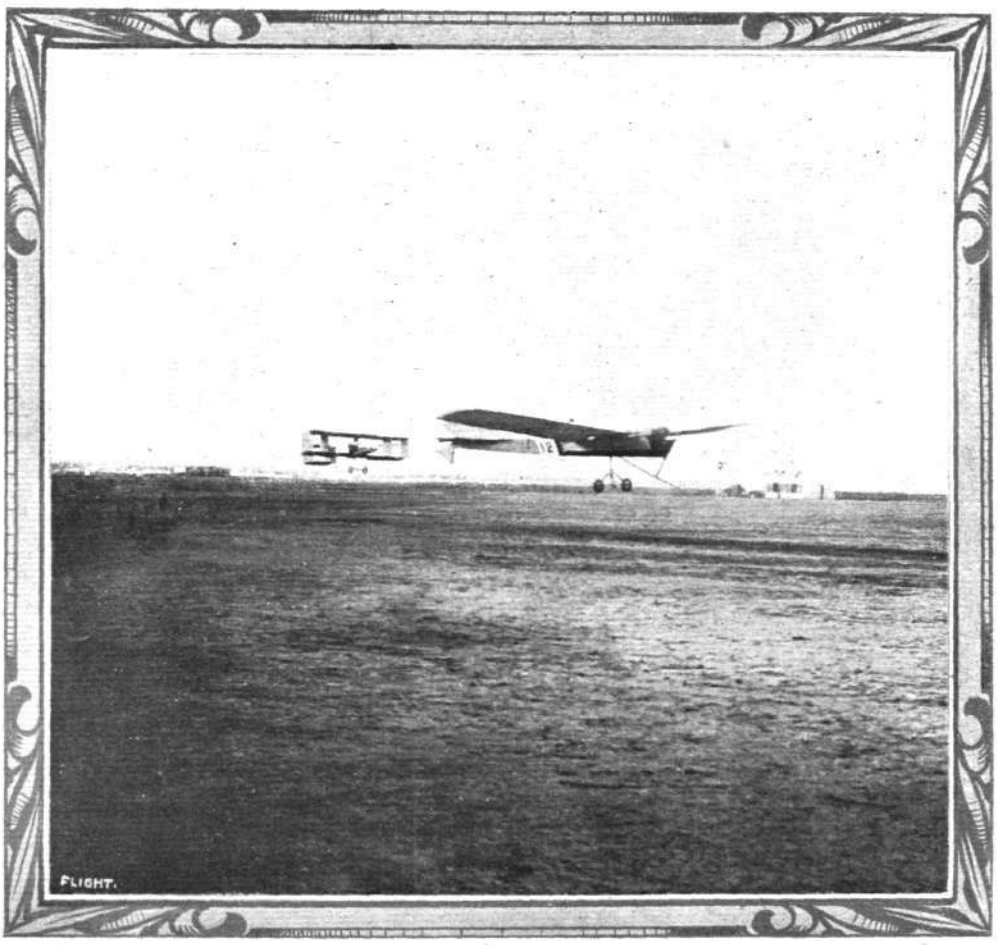

HELIOPOLIS AVIATION MEETING.—An incident during the competitions. Latham, on his Antoinette, with Rougier, on his biplane, behind.

THE AEROPLANE *VERSUS* THE DIRIGIBLE.

By J. LAURENCE PRITCHARD, B.A.

SOME weeks ago there appeared, in the correspondence columns of a daily newspaper, a letter in which the writer stated that he thought the aeroplane a mere toy, and, furthermore, that Great Britain ought to pay all her attention to the dirigible balloon. That letter made me think, and since then I have spoken with many people on the subject, and the majority of them agree with that correspondent. It seems to me, therefore, there is a widespread disbelief in the powers of the aeroplane and an analogous faith in the powers of the dirigible balloon. That such beliefs should exist, among Englishmen (for they certainly do not hold on the Continent to any extent), is cause enough for this article.

A detailed comparison between an aeroplane and a dirigible has not before appeared in print to my knowledge, and such a comparison will, I think, prove instructive, not to say controversial. Still, I am a firm believer in the heavier-than-air machine and its future possibilities, and I am therefore prepared to brave any storm that may arise.

The Zeppelin dirigible is by far the best known and most popular of all dirigible balloons. The Wright aeroplane holds a corresponding position in the heavier-than-air world. I have taken these two machines, therefore, as machines typical of their class, to pit against one another.

That there are better machines for comparison than the Wright and the Zeppelin I am prepared to admit, but if I had chosen them I should have been accused of favouritism towards the aeroplane, an accusation I wish to avoid.

In 1852 Giffard constructed the first balloon that had an independent motion of its own. That was over fifty years ago, and the utmost speed that that dirigible attained was six miles per hour. Its engine was one of 3-h.p. The latest and most cumbersome type of Zeppelin has three motors of 345 total h.p., working six propellers. It has attained a speed of 34 miles an hour. It is stated that it can carry 20 passengers in addition to its crew of 7 or 8. If we say 30 men in all we shall be erring more on the side of exaggeration than otherwise.

Now, consider a Wright aeroplane on a comparable basis with this. The best ground of comparison that naturally presents itself is the propelling power of the two machines—the engines. At present the Wright machine has an engine of 30-h.p., and the total weight of the machine with pilot and passenger is about 1,150 lbs. That is to say, the Wright engine lifts over 38 lbs. per h.p. Say it lifts only 35 lbs. per h.p. With engines of 450-h.p., a Wright machine would lift 15,750 lbs. Thirty-five passengers at 150 lbs. each would weigh 5,250 lbs., leaving a margin of well over 10,000 lbs. for the weight of the actual machine, a weight which would be more than ample. Moreover such a machine would greatly exceed the speed of 34 to 40 miles an hour that a Zeppelin with such engines would attain. Wright, with his present 30-h.p. engine, flies at 40 miles an hour. With engines of 450-h.p. it will be no exaggeration to say that the speed of the machine would be well over 100 miles an hour. It is to be noted, too, that at this speed the aeroplane would have a greater lifting power than I have given, a lifting power calculated on a speed of 40 miles an hour. Also the Wright machine compared with a Zeppelin of similar h.p., would not only fly faster and carry more weight, but would not be such an unwieldy object. The total supporting surface of such an aeroplane would be about 7,800 sq. ft., and the length of the main planes would be only 150 ft. The length of the comparable Zeppelin would be more than three times that amount. Again, the surface of the Zeppelin militates against flying while that of the aeroplane is necessary for flight.

Now consider the cost of upkeep of the two machines. First of all, a Zeppelin depends for its lifting power upon the hydrogen that it contains. This hydrogen is constantly leaking, and the cost of its replacement works out, at a very conservative estimate, to £2,500 a year. This is apart from the cost of running the enormous engines, cost of repairs, insurance, &c. The cost of running the Wright engines would, of course, be the same as in the rival machine. Repairs and so on would actually be less in the Wright, but say that they are the same. We still have the cost of inflating and keeping inflated the Zeppelin vessel, which cost is against the value of the machine.

I am of the belief, too, that the aeroplane will be more useful in every way than the dirigible in warfare. A Wright machine of the size that I have suggested, would for one thing be able to travel faster than its rival. At a speed of 100 miles an hour it would possess greater stability, and with only three or four men on board it could carry a very large supply of petrol, giving it a greater sphere of action. It could go up in any wind that wasn't actually a gale, which can hardly be said of its rival. At the great speed at which it would travel it would be very difficult to hit, and it could go up to higher regions than the dirigible balloon, which would make it still more safe against the enemy's guns.

That the future of travelling in the air lies with the heavier-than-air machines as against the lighter-than-air vessels has been the belief of all the great theorists of the past and is now the accomplished fact of the practical man in the present. As Sir Hiram Maxim has pointed out, "All Nature's flying machines are heavier than air, and depend altogether upon the development of dynamic energy." The dirigible cannot show the advance that the aeroplane has shown, and unless the materials of which it is constructed are radically altered and strengthened in every way, there is no doubt that it will never exceed a speed of 50 miles an hour. Undoubtedly the dirigible has come to stop—where it is!

(*Note.*—The above is only a short sketch of the various points of comparison between the aeroplane and the dirigible balloon, and any correspondence on the subject would be welcomed and answered, if necessary, in a future article.)

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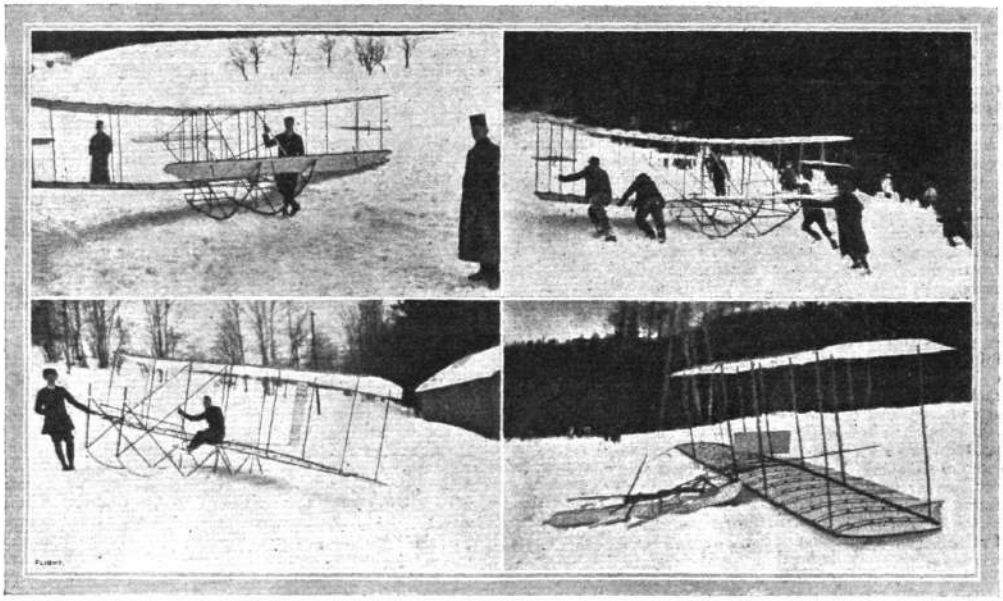
Medals for Dirigible Pilots.

AT its last meeting the Airship Committee of the Ae.C.F. awarded several medals offered by the Club in connection with dirigibles. Medals for duration were awarded to the commander of the ill-fated "Republique," and M. Juchmes; the medal for longest distance to M. Kapferer; medal for altitude to M. Capazza; and the medal for the best sporting results to Count de la Vaulx.

GLIDING AT SEMMERING.

SEMMERING has lost its glory as a hill-climb for motors, but it would appear that it might recover it with the new sport of gliding. On the 16th inst. a competition was arranged for gliders without motors, and some very interesting sport was the result. In the end Fraulein Ehrenzweig proved to be the winner of the first prize, her mount being a monoplane, while Capt. Umlauff was second on a biplane. We give several illustrations taken from the *Allgemeine Zeitung* of Vienna, showing these two competitors during the trials. By a piece of ill-luck Fraulein Ehrenzweig had the misfortune to break her machine in a subsequent trial through making a sudden turn.

It will be seen that the gliders are taken to the top of a snow-covered slope and then allowed to slide down, being accelerated by the willing help of the onlookers. When sufficient impetus has been obtained the pilot operates the elevating plane, and the machine rises and glides for a distance varying with the speed attained.



SKI-GLIDING IN THE SEMMERING.—The two top pictures are Rittmeister von Umlauff's biplane; and below is seen the Brunner-Hoffmann machine before and after the sporting glides.

SKI-GLIDING IN THE SEMMERING.—Fraulein Ehrenzweig, on a "Knoller" monoplane, secured first prize. On the left she is seen ready for the start down for the glide, and on the right is the machine after it came to grief during the second "flight."

THE NEW MAXIM AEROPLANE.

By SIR HIRAM S. MAXIM.

SIX years ago I commenced making drawings with a view to building a flying machine with a petrol motor, but I did not finish it at that time, as I had a lot of other work on hand.

All the flying machines which have been built in recent years do not differ much from my original Baldwyn's Park machine, except as regards size and the kind of motive power employed.

About eighteen months ago, in making a careful study of the whole subject, it appeared to me that the Baldwyn's Park type of machine, with slight modifications, was still the best that could be devised. I therefore decided to make another machine, on practically the same lines, but very much smaller, and to drive it with a petrol engine.

I made the drawings, and about twelve months ago started to make a new light engine and a reliable carburettor, in fact, everything relating to my present flying machine.

The engine which I designed has four cylinders, each 5 ins. in diameter, with a common stroke of 5¼ ins. The cylinders, pistons, connecting-rods, and the crank-shaft, are made of a special brand of "Vickers" steel, which perhaps is the strongest and toughest steel that has ever been produced, in fact, I have never seen anything to compare with it. It has a tensile strength of 57 tons, with an elongation of 14 per cent. This is remarkable, and it enabled me to make all the parts of extreme lightness and still have a reasonable factor of safety, moreover, the great lightness of the moving parts enables the engine to run faster if required than it would if the parts were heavy.

In order to get a high speed if required, I made all the passage ways and valves of the engine very large and free. I had noticed at the various places on the Continent where I had seen flying machine engines in action that they worked very badly and unsteadily, the exhaust being very irregular. A study of this question demonstrated only too clearly that the great trouble was with the carburettor; the explosive charge was not thoroughly mixed, or perhaps not mixed at all, and never of a uniform density.

I therefore experimented on a carburettor and made one that would produce gas of a uniform density, and it was found that when the air and the gas were thoroughly mixed before they entered the cylinder at all, the petrol engine behaved exactly as a gas engine does. The exhaust was perfectly regular, and, as a well-known steam engineer said on witnessing the running of my engine, "It runs as steady as any steam engine I have ever seen, and altogether different from any other petrol engine."

This engine has a forced water circulation, and everything about the engine, including the spindles of the exhaust valves, is cooled, so there is never any overheating.

A new system of oiling is also used. A small pump, having a bore of 1¼ in., and a stroke of 1½ in., is so arranged and driven by a train of gears and "clockwork," that the piston is raised against the resistance of a spring, and liberated four times in a minute, and the spring is of sufficient strength to produce a pressure of 120 lbs. per sq. in. on the oil, the result being that every part of the engine, including the gudgeon-pins, is thoroughly lubricated four times a minute, and it has been found that no excess of oil gets past the piston into the explosion-chamber.

The screw propellers are three in number. One is placed directly on the screw shaft, and runs, of course, the same speed as the engine, and takes the place of a fly-wheel; the others are very much larger, and revolve at a much slower rate.

Two of the screws, the small one, and one of the large ones, rotate in a right-hand direction, and the other one in a left-hand direction, but the left-hand screw has a finer pitch than its mate, and revolves at a higher velocity, just high enough so that its gyroscopic action is equal to the gyroscopic action of the other two screws, and the rotating parts of the engine; therefore there is no gyroscopic action at all when the screws are considered "*ensemble*," as the left-hand screw exactly neutralises the gyroscopic action of all the other rotating parts.

The framework of the machine has been made of American yellow pine of a very fine quality. Although it is not quite so strong as spruce per square inch, it is really stronger than spruce when considered in terms of its own weight. Moreover, spruce was difficult to obtain.

The machine has fore and aft rudders (balanced) and one horizontal rudder also balanced.

The main part of the machine is made up of six aeroplanes; the central section carries the machinery and the driver, and the two side sections are simply superposed wings, but they are not level. The outside ends are raised very much above the central section, and their surfaces are curved in such a manner that when the machine is in the air whichever side is the lower will lift the most. This ensures lateral stability, without the necessity of any machinery.

I know that some mathematicians might dispute this, as they believe, or think they believe, that the pressure on the aeroplane is always perpendicular to its surface, but if they would give the matter one moment's careful consideration they would know that such is not the case.

It would be a case, I will admit, if the whole machine was mounted on a shaft, and could rotate in the air after the manner of a windmill, but the machine is not mounted on a shaft, it is suspended in the air and resting on the air, and falling through the air at the rate of 6 or 7 miles an hour. True, it is going ahead at the same time, but nevertheless it is falling as relates to the air, therefore its downward motion through the air, while travelling, has the same effect as it would if the machine was not travelling at all, but simply falling through the air. Therefore, the side that is lowest and presents the best angle to the wind, and also presents a lifting effect farthest from the centre of gravity, must lift the most, and have a strong tendency to keep the machine on an even keel.

The centre of gravity, however, is very low, and very much below the centre of lifting effect. This, of course, also tends to keep the machine right side up.

I have also applied a device which I invented and patented many years ago, which enables the pilot to vary the pitch of the wings while the machine is still in flight; but instead of doing it after the manner of the Wright Brothers, I strictly adhere to my original patent, the wings being moved in one direction by hand, and in the reverse direction by a spring. But this device I do not think will be absolutely necessary on account of the shape of the wings and the arrangement of the weights.

In making this machine I have sought to group all the parts together, as near as I can, in line (tandem) in order to reduce the atmospheric resistance as much as possible, and to have what there is of it in the path of the screw, that is, the motor, the driver, the densest part of the framework, the magneto, steering-gear, and the petrol tank are all placed in line very low down, and all in the path of the small screw, so that if it should take, we will say, 10-h.p. to overcome the resistance of these parts, the 10-h.p., having been expended on the air itself, would draw the air forward in the direction of flight, so that the screw would be running in air which was already advancing, and fully 80 per cent. of the energy would be recovered by the screw.

It is the same also with the two large screws. All the parts that offer considerable resistance are forward of the screw, so that as much as possible of the energy lost in atmospheric resistance will be recovered.

The width of the aeroplanes fore and aft is 6 ft. 6 ins., and they are 6 ft. 6 ins. apart.

I have not given so much curvature to the aeroplanes as one would find on most of the machines of the present day, because in my early experiments I found that, when we consider the lifting effect of an aeroplane in terms of the drift, the thin aeroplanes, which are only slightly curved, do the best. Quite true, they do not lift so much per square foot, but they lift more per h.p., and I have preserved the shape which was found best at Baldwyn's Park.

Both the top and the bottom sides of the aeroplanes are covered with very thin and extremely strong waterproof silk. It is altogether the strongest and lightest I have ever seen, weighing only about 2 ozs. to the square yard.

This silk is laced on to the aeroplanes with a great deal of care, and the whole of it as tight as a drumhead.

The aeroplanes are thin and sharp. The stays are of two kinds—oval steel and flat steel, and the struts partly of oval steel tubing and partly of American pine.

The total width of the machine is 44 ft.

One of the novel features of the machine which makes it look so much neater and simpler than other forms is the manner of constructing the frame and mounting the screws. Instead of having a lattice-work frame running round the screws to support the aft rudders, the screws are not mounted on a rotating shaft, but rotate themselves on a part of the framework of the machine.

In fact the real foundation of the machine consists of two steel tubes, to which everything else is suspended or attached, and it is these steel tubes on which the screw-propellers rotate.

This enables the principal member of the framework of the machine to pass directly through the centre of the screws, as an extension of these steel tubes carries all the rudders—fore, aft and vertical.

The screws being of very large size—over 11 ft. in diameter—of necessity have to be made very thin, in order to be light, and also

in order to cut the air with little resistance. They are of pine, of the Baldwyn's Park type, which is common to nearly all machines at present, but a new feature has been introduced.

As the screws are not strong enough by themselves to stand the thrust without being distorted and broken, they are held back by strong steel strips $\frac{1}{16}$ in. thick, and about $1\frac{1}{4}$ in. wide.

These strips, having the same pitch as the blades themselves, also act as a screw propeller, cutting the air keenly, and being very efficient. The screws are therefore held in position, their blades can neither be twisted nor deformed, and there is nothing to prevent their cutting through the air with the least possible resistance. By this means a very large amount of air can be engaged—a great deal more than has ever been engaged before per h.p.—therefore there would be less slip than with any other system so far invented.

Moreover, the resistance required for driving the machine through the air would be less, because everything is much sharper and smoother than in any other machine I have ever seen, but unfortunately a large and level field is not obtainable near the Crayford Gun Works at the present moment. True, land can be obtained, but it costs a lot to get it and to level it off and protect it, so I have devised a new system of testing—one that I think is quite different from anything suggested before.

I have constructed a tarred sand circular track, having a circumference of 2,200 ft. This track is 25 ft. wide, and in the centre I have erected a steel mast, to which I propose to attach a steel wire rope about 35 ft. from the ground, and to hold this rope up by very fine wires from another support over 100 ft. high. The steel wire will have attached to it three branches, which will take hold of the machine in three places, and in this way the machine will be held on an even keel, as far as relates to "port" and "starboard," but will be free to move forward, to ascend and descend; and will also be free to depress or elevate the forward end, that is, every movement which is necessary to make when testing a machine is obtained, while the machine is prevented from flying off at a tangent.

It will therefore be possible not only to try the working of the engine, the cooling effect of the air, the propulsion of the screws, the lifting effect of the aeroplanes, the balancing of the weights, and, in fact, everything connected with the working of the machine, without any danger whatsoever of injury to the pilot or breakage, while it affords a unique opportunity for the pilot to learn to manipulate all the necessary steering-gear, and so forth, and it is very evident that after this has been done for a certain length of time, the machine may be connected with a single wire, so as to find out if all the other movements are completely under control, and after this free flight ought to be quite simple and safe.

At any rate, a circular track will always afford a very simple manner of teaching men to fly, because they can do it without danger to themselves or to the machine.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

(NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by 12 noon on Wednesday at latest.)

Aeronautical Society of Great Britain (53, VICTORIA ST., S.W.).

THE annual general meeting of the Aeronautical Society will be held at the Royal United Service Institution, Whitehall, S.W., on Friday, March 18th, at 7.30 p.m. Members only will be admitted on production of their brass badges.

The proceedings will be followed by the first meeting of the 45th Session at 8.30 p.m., when Mr. F. W. Headley, the eminent naturalist, will deliver a lecture, illustrated with lantern slides, on "The Flight of Birds." Ticket holders will be admitted to the theatre on the conclusion of the annual general meeting.

The Society's new badge has been struck in bronze, silver, and gold; and members desirous of obtaining it are requested to communicate with the Assistant Secretary.

The Society's reception room for members at the March Aero Show at Olympia will be situated between the Annexe and the Main Hall, facing Messrs. Sidney Smith's stand.

Kite-Flying Association (27, VICTORY ROAD, WIMBLEDON).

THE general meeting will be held on Monday, 28th inst., at Caxton Hall, Westminster, when the Vice-President, Mr. W. H. Dines, will read a paper on "Kite Flying at the Chief Official Station of the Meteorological Office, Pyrton Hill, Oxfordshire." Other important business will be the discussion to change the name of the Association to the Model Aeroplane and Kite-Flying Association. The following gentlemen have been nominated on Council:—Messrs. T. W. Clarke, Fleming Williams, and T. O'B. Hubbard, in addition to present Council, which have been re-nominated with three exceptions. Patrick Y. Alexander, Esq., has also been nominated as a Vice-President.

Motor Union (Aviation Section). (CAXTON HOUSE, S.W.)

TO those who are interested in the construction of aeroplanes, a unique opportunity for inspecting the works of the most famous French manufacturers will be afforded at Easter by the Aviation Section of the Motor Union. The Committee are planning a visit to Paris and have already received permission from the following firms to visit their workshops:—Neubauer and M. Farman, A. Darracq and Co., L. Chauvière, Société des Moteurs Gnome, Dutheil, Chalmers and Cie., Robert Esnault-Pelterie, Antoinette Co., and Clement-Bayard Co.

Scottish Aeronautical Society (185, HOPE STREET, GLASGOW).

ON Wednesday, the 16th inst., at the Philosophical Society's Lecture Room, Mr. E. V. A. Willett, B.Sc., gave the first of a series of lectures which have been arranged for the spring months. His subject was "Air Pressure on Planes." The subjects of the other lectures will be:—ii. "The Curve Plane and its Application to Flying Machines"; iii. "Flight as an Engineering Problem (Elementary Functions of an Aeroplane"); iv. "Stability (Directional, Longitudinal, Transverse"); v. "Propellers"; vi. "Design."

Sheffield Aero Club (36, COLVER ROAD, SHEFFIELD).

A PUBLIC general meeting was held on the 16th inst. Owing no doubt to the inauspicious weather the attendance was only moderate. The rules and club badges being ready, a large number of these were disposed of, the charge for the latter being 2s. 6d. each, cost price, to members only. They were much admired both from their appearance and originality of design.

It was announced that works had been taken, and as soon as the necessary alterations had been made, would be opened to the members. They are large and central, and fitted for the work. It is proposed to put a full-size machine in hand at once. The model flying competition scheme, in connection with the Sheffield Charity Tournament on Whit Monday, was discussed. A sum of £15 has been voted towards the prize fund, which should prove a big inducement. Some 20 models have been entered, varying in size from the minimum considered advisable—4 ft. spread—to several 10 ft. spread engine-driven machines. The secretary requests members to attend the meetings as regularly as possible, as much important work will be discussed at the next few meetings. The next general meeting will be held on Wednesday, March 2nd, at 8 p.m., at the Deaf and Dumb Institute (near Hippodrome), Upper Charles Street, City. All interested persons are cordially invited.

S.W. England Aeronautical Soc. (51, ST. LEONARD'S RD., E. SHEEN)

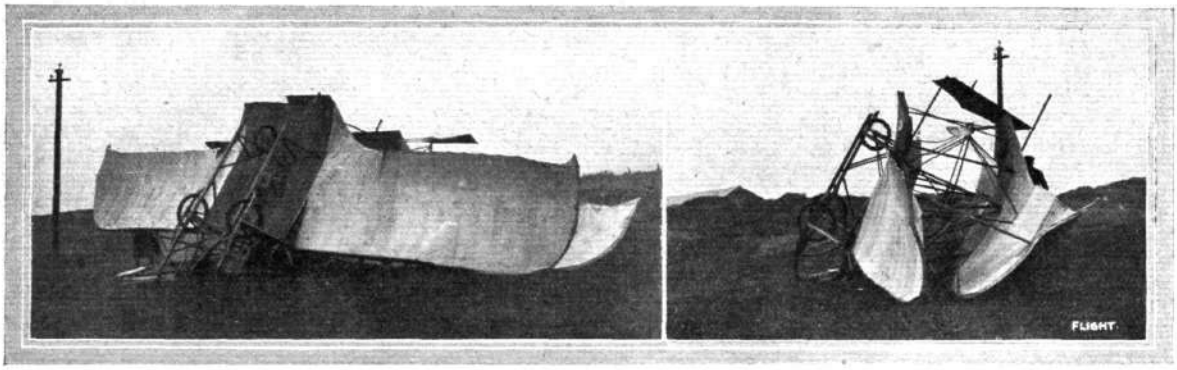
THE next general meeting will be held on Sunday, March 6th, at the Ship Hotel, Bridge Road, Hammersmith. The monoplane is now nearing completion, and certainly has a most promising appearance. Members willing to assist should attend any night at the club's aero works, Down Place, King Street, Hammersmith. Sir William Bull, M.P., has recently showed his appreciation of the club's work by accepting the position of a Vice-President. Entrants for the model competition should remember that Messrs. A. J. Fransella, J. Furley-Smith, and J. L. Warsop are offering prizes, as well as the prize and several certificates from the society itself. Prominent gentlemen will judge, and competitors should send in their entries at once. Entrance fee, 1s. Every model entered, 1s. 6d.

Women's Aerial League (227, STRAND, W.C.).

THE second of a series of aerial teas given by the Women's Aerial League will take place on Thursday, March 3rd, at 3 o'clock, in the Victoria Hall, Criterion Restaurant. There will be short speeches on aviation, and some excellent music. Miss Dorothy Levitt will give an account of her experiences learning to fly in France, and Miss Sheila O'Neill is expected to bring a model which she has built. Mrs. Monde is acting as hostess, and among those ladies who are presiding at tables and bringing guests are the Lady O'Hagan, Mrs. Sydney Lacon, Mrs. Roy-Batty, Mrs. Percy White, Mrs. Hughes Hughes, Mrs. Watt Smith, Mrs. Steuart Erskine, and Mrs. Simpson.

The dates of lectures for the Boys' and Girls' Aerial League, by Mr. Blin Desbleds and Miss Gertrude Bacon, will be announced shortly.

THE SANDERS AEROPLANE.



THE SANDERS AEROPLANE MISHAP.—Two views of the biplane taken immediately after the fall.

LAST week we recorded the mishap to the Sanders aeroplane, and we are now able to give some photographs of the "incident."

Captain Sanders, of the London Aeroplane and Aerial Navigation Co., has been working very quietly in conjunction with Messrs. J. W. Brooke and Co., Ltd., of Lowestoft, on this biplane on the Benacre Denes, about 5 miles from Lowestoft, and has gradually built up this machine to a successful issue, a number of flights having been carried out from time to time.

The accident, which took place at 8 o'clock in the morning, was not the outcome of any fault of the machine or the motor. As we stated last week, it was owing to the close proximity of some coastguard telephone poles, the tip end of one of the wings catching the top of one of these poles, and so bringing the machine right round and completely upsetting the balance.

The motor used in this biplane is a 30-h.p. Brooke, and weighs as much as 240 lbs., as after building several engines for flight purposes, Messrs. J. W. Brooke and Co. came to the conclusion that it was better to sacrifice lightness to obtain reliability. Captain Sanders has looked after the engine himself for several months without any trouble, and intends using the same engine in his new aeroplane. The Sanders machine weighs in flying order 1,100 lbs.

THE SANDERS AEROPLANE MISHAP.—A few moments after the crash. Capt. Sanders standing by the machine. Note the splintered spar which passed through Capt. Sanders' clothing, fortunately without injuring him.

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Bristol as a Flying Centre.

PRESIDING at a meeting of the Bristol Tramways Company last week Sir George White, Bart., said that for some time he and his brother had been giving their attention to aviation, which seemed to offer promise of development at no distant date, and they had determined to endeavour to develop the science both from the spectacular and the manufacturing point of view. They had already ordered three aeroplanes with a view to testing them, and when they have decided which is best they hoped to start a factory at Bristol. Probably public demonstrations would be held during the coming summer, and this ought to secure for the tramways a new and important source of revenue, as they would take care to ensure that the demonstration ground was alongside the tramway lines. The flying meetings should attract great crowds to Bristol, which would benefit thereby.

A School Magazine—"Aviation."

OFTEN as we have advocated the popularisation of aeronautic study and experiment with the younger generation, who are now preparing in our schools for the work of life a decade or so ahead, we have never before the present week received a real school magazine devoted exclusively to this fascinating subject of human flight, written, reproduced, and circulated by some of the boys themselves. The magazine in question hails from the Liverpool College, and its sheets are printed by C. H. Rowed, the Editor, on a hectograph which he made himself; while in addition to a full page of sketches—of the Blériot monoplane—the illustrations include a photograph of Mr. Cody's biplane awaiting trial at Eccleston Park. Its printed cover, which bears the name of "The Park Press," gives, moreover, quite a business-like air to this enterprising "monthly."

FLIGHT

AERIAL PROPELLERS.

BY A NAVAL CONSTRUCTOR.

(*Concluded from page* 125.)

WE shall now deal with twin screws, each 6 ft. diameter. This means that we must design each screw for 75 lbs. thrust and proceed as before.

Diameter of propeller 6 ft. For two-bladed propeller $\kappa = .58$.

Thrust = 75 lbs.

Pitch Ratio.	Slip.	Efficiency.	r.p.m.	Brake h.p. Without Gearing.	Brake h.p. With Gearing.
·6	·140	66·5	1,160	24·6	25·9
·8	·237	69·5	985	23·6	24·9
1·0	·285	70·0	840	23·4	24·7
1·2	·330	69·0	745	23·7	25·0
Three-bladed propeller $\kappa = .435$:—					
·6	·085	67·5	1,090	24·3	25·6
·8	·177	71·0	910	23·1	24·4
1·0	·230	72·5	780	22·6	23·9
1·2	·273	72·5	680	22·6	23·9
Four-bladed propeller $\kappa = .375$:—					
·6	·050	67·5	1,050	24·3	25·6
·8	·147	71·5	880	22·9	24·2
1·0	·200	74·0	750	22·1	23·4
1·2	·247	74·5	665	22·0	23·3

Suppose we have twin screws of 8 ft. diameter developing a thrust of 75 lbs. each. Then we calculate the following table as before.

For two-bladed propeller $\kappa = .325$:—

Pitch Ratio.	Slip.	Efficiency.	r.p.m.	Brake h.p. Without Gearing.	Brake h.p. With Gearing.
·6	·025	67·5	770	24·3	25·4
·8	·120	71·5	640	22·9	24·0
1·0	·170	75·0	542	21·9	23·0
1·2	·220	75·5	475	21·7	22·8
For three-bladed propeller $\kappa = .244$:—					
·6	—	—	—	—	—
·8	·070	70·0	605	23·4	24·5
1·0	·130	76·0	518	21·6	22·7
1·2	·175	77·25	455	21·2	22·3
For four-bladed propeller $\kappa = .210$:—					
·6	—	—	—	—	—
·8	·050	69·5	592	23·6	24·7
1·0	·100	76·0	500	21·6	22·7
1·2	·150	77·5	441	21·1	22·1

It will be noticed that wherever possible we should increase the diameter of the propeller. The 8 ft. diameter propellers being, in every case, more efficient than those of 6 ft. diameter.

If we were using propellers of 8 ft. diameter we should choose one having a pitch ratio of 1·2.

The four-bladed requires 22·1 b.h.p. at 441 r.p.m.

The three-bladed requires 22·3 b.h.p. at 455 r.p.m.

The two-bladed requires 22·8 b.h.p. at 475 r.p.m.

From a practical point of view we should choose the two-bladed propellers for the reasons already given.

It will be noticed in the above that the least efficiency obtained was 60 per cent., and the highest 77·5 per cent. These are very good values.

No propeller yet tried has given as high an efficiency as 80 per cent.

It is extremely doubtful if some of the makers of aeroplanes can get as high an efficiency as 60 per cent. with their present machines.

The case worked out corresponds almost exactly to that of the Wright machine. It will be remembered that the Wrights have an engine of 25 nominal brake horse power driving two two-bladed propellers of 8 ft. diameter at 450 revolutions per minute. The approximate speed is 40 miles per hour. The Wright propellers seem to be very well designed.

In several of the other makes, however, 50 per cent. would be the maximum obtainable. In one particular case the approximate pitch ratio is ·35.

With a well-constructed propeller we could not hope to get much more than 40 per cent. efficiency with this low value of the pitch ratio. This is very bad and should certainly be improved upon.

In the curves it will be noticed that the propellers give a definite amount of thrust at zero slip. This is caused by the shape of the section of the blade which is given in the next chapter. If the section of propeller-blade was perfectly flat on both sides, the thrust at zero slip would be nothing.

When we are working out the best type of propeller, we should decide each case on its merits. No definite rule can be given. If we can get an overall efficiency (that is gearing included) of 70 per cent. we should consider this very good.

Three or four attempts should be sufficient to determine the propeller best suited to our purpose.

CHAPTER VII.—To Design a Specified Propeller.

We shall now proceed to design the propeller which we found most suitable in the example taken in the last chapter.

This, it will be remembered, was a twin-screw, two-bladed propeller of 8 ft. diameter, having a pitch ratio of 1·2 and No. (C) blade.

This blade, as stated previously, has a "disc area ratio" of ·11.

The area of the disc swept out by the tip of the propeller is $\frac{\pi}{4} \times (\text{diam.})^2 = \frac{\pi}{4} \times (96 \text{ ins.})^2$ where $\pi = \frac{22}{7}$.

Hence area of propeller blade is

$$\cdot 11 \times \frac{\pi}{4} \times (96)^2 \text{ sq. ins.} = 800 \text{ sq. inches nearly.}$$

Also the pitch of the propeller is equal to the diam. × pitch ratio = 8 × 1·2 = 9·6 ft.

Now the shape of the blade is rectangular with rounded corners.

RULE 1.—In all cases of propeller design the inner radius of the propeller blade should be $\frac{1}{6}$th of the outer radius.

In the present instance the outer radius is 4 ft., or 48 ins. Therefore inner radius is $\frac{48}{6} = 8$ ins.

Hence the length of the blade measured radially is equal to (48 − 8) ins. = 40 ins. But the total area is 800 sq. ins.

Therefore the width of blade = $\frac{800}{40} = 20$ ins.

(NOTE.—The (C) blade is the widest type used.)

Accordingly the developed shape of the blade is a rounded rectangle of size 40 ins. by 20 ins.

RULE 2.—The thickness of the centre of the blade at the root is $\frac{1}{60}$th the *diameter* of the propeller, and the tip $\frac{1}{180}$th the diameter, the thickness diminishing uniformly as we go from the root to the tip.

In this case the thickness at root = $\frac{1}{60} \times 96$ ins. = 1·6 ins.; thickness at tip = ·53 in.

RULE 3.—The radius of the circle for rounding off the corners of the blade should be $\frac{1}{4}$ the width of the blade.

In this case radius = $\frac{20}{4}$ ins. = 5 ins. To avoid complication the edges have not been rounded off in the diagram. It is easily done, however, by following the methods given.

To lay off the propeller blade:—

In Fig. 1 set off *ab* equal to the pitch (= 9·6 ft.) to *any* suitable scale.

In the diagram this scale is $\frac{1}{2}$ in. = 1 ft. Now set out *ac* at right angles to *ab* and equal π × diameter = $\frac{22}{7}$ × 8 = 25·12 ft. to the same scale.

Divide *ac* into six equal parts at *f*, *g*, *h*, &c., and join *f*, *g*, *h*, &c., to *b*, as shown in Fig. 1.

In Fig. 2 lay off to a suitable scale *o*, *p*, equal to the radius of the propeller.

In this case radius = 4 ft., and scale is 2 ins. = 1 ft. Now divide *o*, *p*, into six equal parts o_1 o_{11}, o_{11} o_{111}, &c., and set out the rectangle *a*, *b*, *c*, *d*, to represent the propeller blade of 40 ins. × 20 ins. whose centre is at o_1 (scale 2 ins. = 1 ft.).

Now make *i k*, *n o*, &c., in Fig. 1 equal to a_1 b_1, l_1 m_1, &c., in Fig. 2.

Now at the same scale (2 ins. = 1 ft.) in Fig. 1 set out *e f* at right angles to *a c*, and equal to the thickness of the centre of blade at the root, that is = 1·6 ins.

Also at *c* set out *c d* = thickness of blade at the tip = ·53 in.

Join *d e* as shown.

Then, at every section, *f*, *g*, *h*, &c., we describe circles with centres at *f*, *g*, *h*, &c., and radii equal to the off-sets on the straight line *d e*, as shown.

Now describe arcs of circles touching each of these circles and passing through *k i*, *n o*, &c.

Then these represent the sections of the propeller blades at the different points, o_{1}, o_{111}, &c., in Fig. 2.

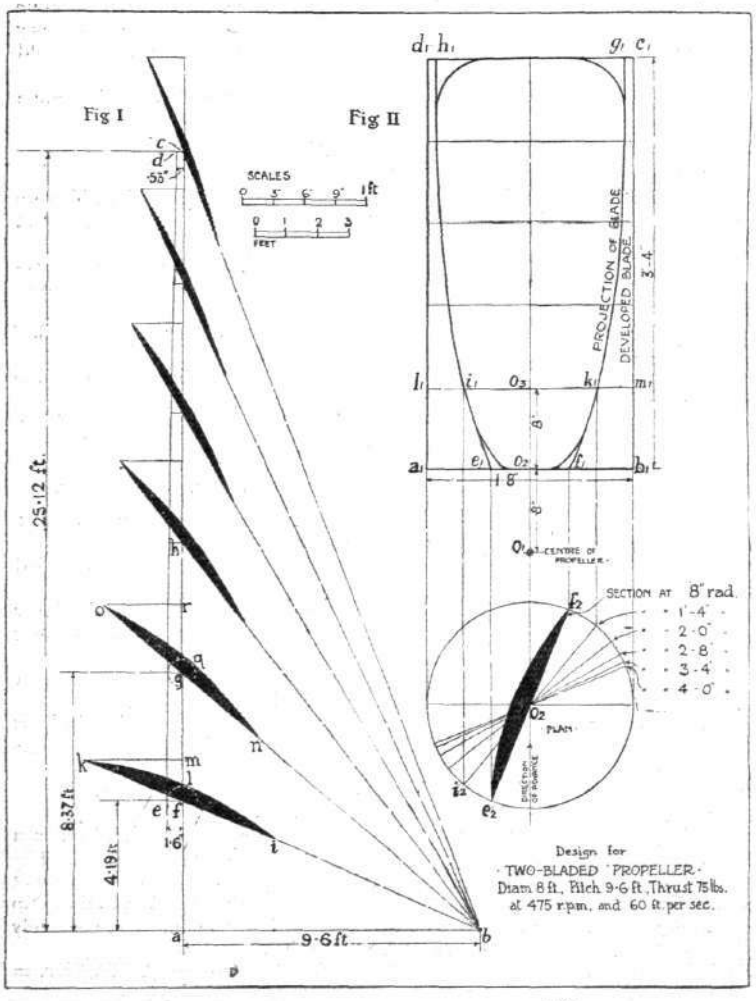
They are shown shaded in Fig. 1.

Again draw *k m*, *o r*, &c., in Fig. 1 perpendicular to *a c*.

Take the lengths *f m*, *g r*, &c., in Fig. 1 and lay them off on the corresponding section in Fig. 2, that is, $o_{11} f_1$, $o_{111} k_1$, &c., and draw the curve $f_1 g_1$ through the spots so obtained.

Draw the same curve on the opposite side of $o_1 p_1$, namely $e_1 h_1$.

Then $e_1 f_1 g_1 h_1$ represents the projection of the blade in a vertical plane.



That is, it presents the view of the blade when looked at from the "after" side.

To get the plan of the propeller we merely project down. This is immediately obvious from the figure.

In order not to complicate the plan, only one section has been drawn in, namely, that corresponding to *i k* in Fig. 1, and to *e f* in Fig. 2.

It must be particularly noticed that the driving or pressure face of the blade is flat, and to avoid a possible mistake the direction of advance of the propeller is given in the plan.

The method of making the propeller and connecting it to the shaft is left to the designer. It can be made in one piece of metal or wood, or it may be built up. In any case, it is important that the sections of the propeller should be the same as the designed sections, and the faces of the blades should be faced up with polished wood if possible.

If convenient, the blade should be well polished, and no projections should occur on the surface.

If the above rules be carefully worked to, the propeller will do the work it is designed for.

NOTICE.—In response to numerous requests by readers, the series of articles, upon aerial propellers, by "Naval Constructor," which have appeared in these pages, will shortly be republished in book form.

FLIGHT

ROYAL AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

Annual General Meeting.

The Annual General Meeting of the members of the Royal Aero Club of the United Kingdom will be held on Thursday, March 10th, 1910, at 5 o'clock, at 166, Piccadilly, London, W.

Committee.

In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the Committee are :—

Ernest C. Bucknall.	Earl of Hardwicke.
Vice-Admiral Sir Charles Campbell, K.C.M.G., C.B., D.S.O.	V. Ker-Seymer.
	J. T. C. Moore-Brabazon.
	Hon. C. S. Rolls.
Col. J. E. Capper, C.B., R.E.	Roger W. Wallace, K.C.
Martin Dale.	

The Earl of Hardwicke does not offer himself for re-election.

The following members have been nominated :—

R. M. Balston.	P. Harrington Edwards.
Major Sir A. Bannerman, Bart., R.E.	Philip Gardner.
	V. Ker-Seymer.
Ernest C. Bucknall.	E. Gordon Lennox.
F. Hedges Butler.	E. Manville.
Vice-Admiral Sir Charles Campbell, K.C.M.G., C.B., D.S.O.	J. T. C. Moore-Brabazon.
	Hon. C. S. Rolls.
Col. J. E. Capper, C.B., R.E.	Sir Charles D. Rose, Bart.
Major-General Cummins, C.B., D.S.O.	A. Mortimer Singer.
	Hon. A Stanley, M.P.
Martin Dale.	R. W. Wallace, K.C.

Members are reminded that a ballot paper for the election of nine candidates to seats on the Committee of the Club will be forwarded to them at least seven days before the date of the annual general meeting.

No ballot paper which is signed, or on which the number of candidates voted for is more or less than the number of vacancies, or which is received at the Club later than 12 noon on Wednesday, March 9th, 1910, will be valid.

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 22nd inst., when there were present :—Mr. R. W. Wallace, K.C., in the chair, Mr. Ernest C. Bucknall, Mr. Martin Dale, Mr. John Dunville, Professor A. K. Huntington, Mr. V. Ker-Seymer, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, Hon. C. S. Rolls, Mr. Stanley Spooner, and joint secretaries, Capt. E. Claremont, R.N., and Harold E. Perrin.

New Members.

The following new members were elected :—

Rear-Admiral Hon. Thomas S. Brand, R.N.	Fred May.
	Alfred Rawlinson.
George A. Clark.	Sir George White, Bart.
Capt. A. E. Davidson, R.E.	Samuel White, J.P.

International Aviation Meeting at Bournemouth.

The Committee of the Royal Aero Club received a deputation rom Bournemouth, including the Mayor and Councillor Bell, on Tuesday last, when final details in connection with the International Aviation Meeting to be held at Bournemouth in July next were settled. The Aviation Ground at Southbourne has been officially sanctioned by the Royal Aero Club, in whose hands all arrangements for the meeting will be centred. Prizes up to the amount of £8,000 will be offered, and full particulars of the various events will be announced shortly. The Aviation Week will be run in connection with the Centenary Fêtes, towards the expenses of which a guarantee fund of £24,000 has already been subscribed.

Aviation Lecture.

Dr. H. S. Hele-Shaw will deliver a lecture at the Royal Automobile Club, 119, Piccadilly, W., on Wednesday, the 2nd March, 1910, at 9 p.m., entitled "A Comparison of the Problems Presented Respectively by the Dirigible and the Aeroplane." The chair will be taken by Col. J. E. Capper, C.B., R.E.

The Royal Automobile Club have kindly placed at the disposal of the Royal Aero Club a number of tickets for those members of the Club who are not members of the Royal Automobile Club. Members wishing to attend are requested to apply for a ticket from the secretaries of the Royal Aero Club.

Gordon-Bennett Aviation Cup.

The Committee of the Royal Aero Club has sent in a challenge to the Aero Club of America to contest the Gordon-Bennett Aviation Cup, which will be competed for in October next in the United States.

The following members have sent in entries :—

Hon. M. Egerton.	Hon. C. S. Rolls.
Mr. J. T. C. Moore-Brabazon.	Mr. A. Mortimer Singer.

The selection of the three competitors to represent the Royal Aero Club of the United Kingdom will be made at a later date.

Gordon-Bennett Balloon Race.

The Committee of the Royal Aero Club has sent in a challenge to the Aero Club of America to contest the Gordon-Bennett Balloon Race, which will take place in the United States in October next.

The Royal Aero Club will be represented by one balloon, in charge of either Mr. John Dunville or Mr. A. Mortimer Singer.

Mr. A. Mortimer Singer.

The Chairman of the Royal Aero Club has received a cablegram from Mr. Singer to the effect that he is making good progress, and hopes to be flying again in six weeks' time.

Model Flying Machines at Olympia.

A very interesting section of the Aero Exhibition at Olympia will be the models. Owing to the large demand for space, the Committee of the Royal Aero Club, to their regret, have been obliged to refuse any further applications for space for model exhibits.

Certificate for Pilot Aviators.

(To come into force on March 1st).

The Royal Aero Club of the United Kingdom may grant pilot aviator certificates to all aviators who, according to the rules of the F.A.I., have complied with the following conditions :—

Three separate flights must be made, each of 5 kilom. in a closed circuit without coming to the ground, but not necessarily on the same day. On the completion of each 5 kilom. circuit the engine must be stopped and a landing effected within 150 metres of a given spot previously designated by the candidate and agreed to by the Official Observer.

Each of the three trials required of candidates must be vouched for by officials appointed by the Royal Aero Club of the United Kingdom. A separate official certificate must be obtained for each flight. All trials are under the control of, and must be made in places agreed by, the Royal Aero Club of the United Kingdom, and in the presence of the responsible officials appointed by the Royal Aero Club of the United Kingdom.

Foreigners belonging to a country represented on the F.A.I. can only receive a certificate from the Royal Aero Club of the United Kingdom after having obtained the consent from the national sporting authority approved by the F.A.I. But a certificate may also be granted to a foreigner whose country is not represented on the F.A.I., without further application.

Candidates desirous of qualifying for a pilot's certificate must make application signed with Christian and surname, and in the case of foreigners, his nationality, accompanied by a fee of one guinea, and two photographs of the candidate. Expenses incurred, if any, must be borne by the candidate. The Club Committee will decide if the candidate shall be granted the certificate, and can refuse or grant the same without having to state any reasons.

All candidates shall satisfy the officials of the Royal Aero Club of the United Kingdom of their ability to fly at least 500 metres, and of their capability of making a gliding descent with the engine stopped, before their applications can be entertained.

Attempts must take place between sunrise and sunset, and suitable previous notice must be given to the Secretaries of the Royal Aero Club of the United Kingdom.

The Royal Aero Club of the United Kingdom declines all responsibility for any accidents, or any damage that may occur to the Pilot Aviators, their machines, or to any third parties during or in connection with the qualifying tests of the candidate.

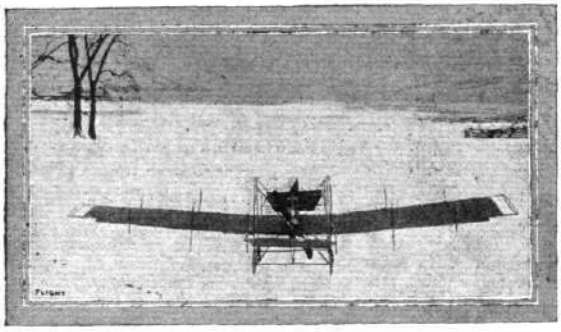
The decision of the officials of the Royal Aero Club of the United Kingdom in all matters connected with these flights to be final and without appeal.

E. CLAREMONT, CAPT. R.N.,
HAROLD E. PERRIN,
Joint Secretaries.

166, Piccadilly.

A NOVEL MONOPLANE.

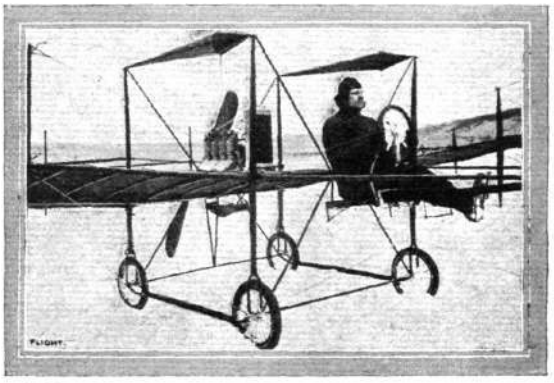
ALTHOUGH most of the machines which have been experimented with in America have been of the biplane type, there is one monoplane with which a certain measure of success has been attained. This is the invention of Mr. A. L. Pfitzner, who has been for some time associated with Mr. Glenn Curtiss, and from the two photographs, which we reproduce from the *Scientific American*, it will be seen that the design is in some ways reminiscent of the Curtiss biplane. The novel feature of the machine lies in the means for maintaining lateral stability. At each end of the main plane there is a sliding tip, which normally lies 15 inches beyond the main plane. These tips are interconnected, and controlled by the steering-wheel, so that when one is slid out to its full extent of 30 inches the other is completely withdrawn, any movement of one being accompanied by a corresponding adjustment of the other.



THE PFITZNER FLYER.—The first American monoplane to fly. Note the sliding wing "tips."

The main plane itself measures 31 ft. by 6 ft., giving an area of 186 sq. ft., while the sliding wing tips are 2½ ft. by 5 ft. Fourteen feet in front of the main plane is the elevator, a single plane 6 ft. by 3 ft., while above it is the triangular rudder 2 ft. high by 3 ft. in length, and both these are connected-up to the single steering wheel. At the rear, 10 ft. from the main plane, is the horizontal tail 6 ft. by 2 ft.

It will be seen that a single propeller is fitted, driven by a 25-h.p. 4-cyl. Curtiss motor. With 6 gals. of petrol in the tanks, 1 gal. of oil, and 1½ gals. of water the machine weighs 430 lbs. The propeller is 6 ft. in diameter, and is said to give 235 lbs. thrust at 1,200 r.p.m.



THE PFITZNER MONOPLANE.—Mr. Pfitzner at the wheel. In this view the general arrangement of the centre of the machine is clearly shown.

A large number of short flights have been made, and the machine rises from the ground very quickly, the average distance run to get up being about 100 ft., when the machine was tried over snow.

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THE "REPUBLIQUE" SUBSCRIPTION IN FRANCE.

SHORTLY after the "Republique" disaster the *Temps* opened a public subscription, with a view to replacing the airship. Altogether 312,000 francs (£12,600) were contributed, and 40,000 francs (£1,600) were spent in providing for the widows of the two Adjutants, MM. Reau and Vincennot. A committee, under the chairmanship of M. Cailletet, president of the Aero Club of France, was appointed to deal with the remaining £11,000, and they asked the various principal constructors to name the lowest price at which they would supply their dirigibles or aeroplanes. In consequence of their patriotic action in giving very low prices, it has been possible to order two dirigibles and four aeroplanes, which with the dirigible which Messrs. Lebaudy are presenting to replace of the ill-fated "Republique" will give the French Government a very imposing aerial fleet. The largest dirigible, of 7,000 to 8,000 cubic metres capacity, will be built by the Astra Company, and named "Lieutenant Chaure," while the other airship will be a Zodiac of 1,400 cubic metres capacity, to be called "Reau-Vincennot."

The aeroplanes will be of the Henry Farman, Maurice Farman, Blériot and Wright types, and they will bear the numbers T^1, T^2, T^3, T^4, the "T" being a compliment to the journal which raised the fund by which they were purchased.

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A Transatlantic Project.

THE plans of Herr Joseph Brucker, the Austrian aviator, for a trip across the Atlantic in a dirigible, would appear to be progressing, and Capt. Messner, who with Col. Schaeck won the Gordon-Bennett Balloon Cup for Switzerland in 1908, is now associated with the scheme. It is proposed to start from Cadiz, then to steer for Teneriffe, and from there to Porto Rico, then, gradually beating back, to sail over Cuba, Havana, New Orleans, and so back to New York. In case of accident it is proposed that the *nacelle* of the dirigible should be a motor boat, the engine capable of being connected to either of two shafts, one for working the aerial propeller above the deck, and the other for the marine propeller, should it be necessary to come down on the surface of the ocean.

AVIATION NEWS OF THE WEEK.

Another Motorist to Turn Pilot.

WE learn from Mr. W. E. de B. Whittaker that he has undertaken to fly a Farman biplane for the Aerial Navigation Company.

The Collier Monoplane.

SATISFACTORY progress is being made with the Blériot type monoplane which Mr. H. A. Collier, the winner of the Tourist Trophy motor cycle race, is building, and he hopes to have it ready for a cross-Channel flight next month. The pilot will, however, conduct his preliminary trials on Plumstead Marshes. The machine will be fitted with a 20-h.p. 8-cyl. J.A.P. engine of special design, and it will be entirely British, except for the Chauvière propeller.

Monoplane at Manchester Show.

FOLLOWING the lead of other motor car shows, the Manchester Show, which was opened last week, had an aeroplane suspended from the roof as a feature. In this case it was the Fletcher monoplane, and was exhibited by the Empress Motor Co. It will be remembered that this monoplane is somewhat similar to the Antoinette, and is fitted with a five-cylinder "Empress" motor.

Flying Meeting at Lanark.

A BOLD bid is being made by the Scottish Aeronautical Society to secure the second fixture allotted to Great Britain by the Fédération Aeronautique Internationale, for a meeting at Lanark, and from the energy which has been put into the preliminary arrangements there would appear to be every possibility of the date being given to them. In that event the meeting will be held from August 6th to 13th on the racecourse, the use of which has been granted free by the Town Council.

Rule of the Air.

WITH regard to the question raised by "Barrister-at-Law," in our issue of January 28th, as to "what shall be the rule of the air?" a forthcoming issue of the *Nautical Magazine* will contain an article from the pen of Mr. Harold R. Ingersoll in which this question is discussed and a suggested rule given, as well as proposals regarding navigating lights for airships and aeroplanes.

SKI-GLIDING IN THE SEMMERING.—Fraulein Ehrenzweig in "flight."

Capt. Dickson Flies Half-an-Hour.

ON the 17th inst. Capt. Dickson, at Chalons, flew for thirty minutes on his Henry Farman machine.

Doings at Pau.

AFTER a visit to the works at Paris, both M. Blériot and M. Leblanc returned to Pau on the 19th with new machines. So great is the demand for these monoplanes that M. Blériot has had to arrange for an extension of his Neuilly works, and has acquired the old Bowling Palace, which is being turned into a factory for machines of the No. 12 type. On the 18th, Delatang, one of the Blériot pupils, flew three times round the course at Pau. All the other pupils have made short trial trips.

At the Wright aerodrome M. Rene Gasnier has qualified for his pilote-aviateur certificate, and Tissandier has been busy giving lessons to the two Government pupils, Capt. Etéve and Capt. Largier.

"La Frégate" monoplane, fitted with 30-h.p. 3-cyl. Anzani motor, and piloted by M. Robert De Lesseps.

Molon at Havre.

ON Saturday week Molon made a couple of good flights at Havre. In the morning he flew for 40 kiloms. across country, passing over Bleville, Sainte-Adresse, and Octerville, while in the afternoon he covered about 30 kiloms. in the same direction.

Sommer Teaching at Mouzon.

ON the 18th inst. M. Sommer flew for nine minutes on his new biplane, in spite of a strong wind and a heavy rain. The same day he commenced the instruction of three pupils, Vestratten, Paillette, and Syberg.

Flying in Austria.

ON February 19th, at Wiener-Neustadt, Herr Wiesenbach made an extended trial with his Wright biplane, flying for 56 minutes, and covering in that time a distance of about 90 kiloms. In the afternoon Herr Wachalowski went up on his Henry Farman machine and flew for 15 mins. 20 secs.; while later he flew for 11 mins., this time taking a passenger with him. He thus won two Gerngross prizes, one of 2,000 crowns (£83) for a 15 mins. flight, and the other of 4,000 crowns (£166) for a 5-minute flight with a passenger.

Mamet at Barcelona.

A GRAND aviation fête was announced to take place at Barcelona on the 17th inst., but the wind prevented any flying until late in the afternoon, when Mamet made two short trials of six and eleven minutes' duration respectively on a Blériot monoplane belonging to Sen. Garcia Cames. At the conclusion of the second flight Mamet stopped the engine and glided down from a height of 100 metres, landing perfectly. On the 19th the aviator made a good flight, but his landing was spoilt by a photographer who got in the way. In endeavouring to avoid him Mamet brought his machine down too suddenly, and as a result smashed the propeller.

American Aero Club.

AT the general meeting on the 9th inst. Mr. Cortlandt F. Bishop was again re-elected President of the American Aero Club, and at another meeting, on the 18th inst. the new rules were adopted by the Club.

Wright Patents and Gordon-Bennett Cup.

ON the 17th, Judge Hand of New York issued to the Wright Bros. a temporary injunction against Paulhan for using the Henry Farman machine, which it is claimed infringes the Wright patents. Should this position be sustained, there is the probability that there would be difficulties with regard to holding the competition for the Gordon-Bennett Cup in America next autumn, and in that event it is not improbable that some arrangement might be made to hold the contest in France.

The above photograph illustrates the medal which will be awarded by the Manchester Aero Club at their Model Exhibition next week.

Flying at Buenos Ayres.

QUITE a large number of lesser-known French flyers have arrived at Buenos Ayres, with a view to taking part in the flying meetings which are to be organised shortly. Among them are Richez, Abrun, Boyer, Picquet, Dolphin, Prerot, Barreton and Pouzelin.

Bregi is continually practising on his Voisin machine, and on the 17th inst. flew 22 kiloms. in 18 mins., at a height of 70 metres. In a second flight he covered 34 kiloms. in 35 mins. Valeton, on a Henry Farman biplane, also made two short flights of about 12 to 14 kiloms. each.

Faccioli Biplane Flies.

FROM Turin comes the news that at the end of last week the new Faccioli biplane was tried with great success, on the aerodrome at La Veneria, near Turin. Several short flights were made, the machine being piloted by the son of the inventor. The span of the main planes is only 6·7 metres, while the length is 3·5 metres, and the machine weighs 170 kilogs. Two propellers are fitted in front, driven by a single-cylinder horizontal motor of 25-h.p. The engine has two pistons. The trials were witnessed by the young Prince of Undine, King Victor's cousin, and he begged to be taken for a trip, but the inventor declined the responsibility.

AIRSHIP NEWS.

Activity at the Lebaudy Works.

AT the present time there are four dirigibles under construction in the Lebaudy works. One is the *Morning Post* dirigible of 9,000 cubic metres capacity; two are for France, each of 6,500 cubic metres; and the other one is for Austria, and is of 4,800 cubic metres. The first three will have Panhard motors, and the last a Mercedes.

Clement-Bayard Airship.

PROGRESS is being made with the airship with which M. Clement proposes to sail to London, but it is unlikely that the trip will be able to be made before the middle of May. The framework of the new vessel is now being erected in the big shed at Compiegne, and this work will take about six weeks, so that the new airship will be ready for trial about the first or second week in April. Its first important trip will be to Paris, and if this is satisfactory and the weather is favourable, the trip to London will follow.

"Espana" Makes a Midnight Trip.

AFTER a short trial trip, lasting half an hour, on the 18th inst., the "Espana" went for a ten hours' cruise, which passed off satisfactorily, and it is probable that an attempt will shortly be made to take the dirigible to its headquarters in Spain.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents asking questions relating to articles which they have read in FLIGHT, would much facilitate our work of reference by giving the number of the letter.

NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

AERONAUTICS FOR THE NAVY.

[369] Your correspondent, Mr. Harold R. Ingersoll, questions my suggestion that dirigibles cannot be expected to go cruising with a fleet at sea, and he inquires how a gale can damage a dirigible when aloft. In saying that the first gale would mean their destruction, I did not wish to convey to the readers of FLIGHT that the actual destruction would take place aloft, because I no more believe this would be the case than that the actual fall from a height can hurt anyone. It is the sudden landing, either on land or sea, in the gale that will work the destruction of the dirigible, because it must give way and drift to leeward as soon as the wind overpowers its driving power. Any attempt to tow with a rope attached to a vessel will also be futile in a gale of wind, because no aerial craft devised up to the present could face a full gale without collapsing under the strain. With regard to the suggestion that fuel could be supplied from a vessel beneath, I must observe that this could only be done in fine weather, and the first gale, entailing as it would the separation of the dirigible from its consort, and the subsequent disastrous landing of the dirigible, because it cannot remain in the air indefinitely, removes the dirigible in its present state from the sphere of practical marine navigation.

With regard to your correspondent's amusing picture of the captive balloon being towed by a vessel chased by an enemy, I must say that, as an old balloonist, I fully appreciate the difficulty of such a manœuvre. Such a "picnic" is one of your correspondent's suggestions, and not of mine. I did not think it necessary to explain that the spherical balloon used at sea would be inflated, and subsequently deflated, after taking the series of observations required, and that gas would be carried on board the vessel for some ten or twenty ascents to be made without returning to a base.

I am glad of the information that the Italian and French Governments each have a balloon ship attached to their Navies. I was not aware of this, but it is welcome news to me, as showing that my suggestion, if not entirely novel, is approved of by two foreign Powers, and may therefore be adopted by our own Navy at a later date.

Engelberg. GRIFFITH BREWER.

THE ROE TRIPLANE.

[370] A correspondent who signs himself "Cylinder" (348), "does not believe that the triplane can ever be designed so as to develop the extreme speeds which we may look for in the not very distant future." I am unable to agree with "Cylinder's" views.

It seems perfectly obvious that the system which requires the least power must naturally be the swiftest, and up to the present the triplane holds the record for flying with little power. Given equal power, I think the biplanes and monoplanes will find a serious rival. Let us take two motor cars of equal power, but one has a badly-designed transmission, which absorbs a considerable amount of power; the other is otherwise, naturally the latter car will run with less power than the other, and would beat it should they race.

My 9-h.p. aeroplane carried over 50 lbs. per horse-power, whereas the French machines usually carry 25 lbs. per horse-power, and Santos-Dumont about 12 lbs. But horse-power is very deceptive, and one cannot get at the true results until they know exactly the cylinder capacity and speed of engine when flights are made.

"Cylinder" asks for the number of revolutions that the 85 by 92 engine gives 9-h.p. It is about 1,600 r.p.m., and that is about the speed the engine used to run at.

The engine I used weighed 96½ lbs. without plugs, but with double ignition, Mabon clutch, chain propeller, shafting, &c., weighed well over 150 lbs.; the whole machine, with self aboard, weighed about 500 lbs.

A. V. ROE.

LONGITUDINAL STABILITY.

[371] The problem of longitudinal stability of aeroplanes is indeed puzzling. In No. 56 of FLIGHT (January 22nd, 1910) on page 55, is a description of the Wright Brothers' patent, in which they state that their machine has increased stability by reason of the small plane in front being set at a *negative* angle to the line of flight. On the very next page Mr. Clarke claims a certain amount of automatic stability for a machine of the same kind by having the small front plane at a *greater* angle than the large back one. Moreover, the arguments in the two cases are quite different, the Wright Brothers seeking to counteract the travel of the centre of pressure, while Mr. Clarke leaves this out of account entirely, giving two arguments for his system, one depending on the alterations of the angles of the planes to the line of flight when the machine is tilted, and the other (in the second column) showing how the line of flight itself tends to keep the same.

Again, in the next issue of FLIGHT (No. 57), at the top of page 74, Messrs. Chittenden and Robinson explain how the travel of the centre of pressure alone tends to keep the machine at the proper angle to the line of flight without any supplementary surfaces at all coming into play.

Analysing the various theories, it seems to me that we must first divide disturbances of longitudinal equilibrium into—

(*a*) Alteration of the angle of the planes to the line of flight.

(*b*) Alterations of the direction of the line of flight itself.

Of course, most disturbances are combinations of (*a*) and (*b*). If the (*a*) kind are produced by variations of speed, the Wrights' negative angle will assist stability by counteracting the travel of the centre of pressure, as they show in their patent, but if speed is not altered, as Messrs. Chittenden and Robinson show, the centre of pressure will travel so as to give a righting effect, and also if the front surface has a greater angle than the back, as in the Clarke glider, a second righting effect will be produced.

As for variations classes under (*b*), Mr. Clarke's arrangement will, by varying the speed of flight, as he shows, tend to keep the line of flight the same, such as the sideways movements produced by the dihedral angle tend to lateral stability.

But then the correct construction for the machines must depend on the proportions in which the various disturbing and righting effects take place. The question is exceedingly complicated, and I should be glad if someone would clear up the problem in my mind by either agreeing with my theories or showing me where they are wrong.

Trusting this letter is not too long.

Wimbledon. B. BRUCE WALKER.

RUBBER PRESERVATIVES.

[372] I should be obliged if you would insert the following lines immediately.

Several of your correspondents recommend vaseline and glycerine as lubricants and preservatives for rubber. I trust none of your readers have tried this treatment. If they have they will soon repent. I know from experience and the advice of several rubber experts that if you want to ruin rubber, glycerine, oil, and vaseline are the most deadly substances you can possibly lay hands on. Anything oily rots rubber and takes away all its elasticity. I have tried, and I know.

The same gentleman who warned me against bringing my rubber into contact with oil told me that a weak solution of washing soda in water was an excellent preservative. I tried this, and am using the same rubber now that I bought in the summer.

Those who have used any of the substances mentioned may very probably be able to save their rubber by bathing and thoroughly rinsing it in a warm solution of soda water.

I have also used a substance called "Slypso," and sold by Messrs. Bonn. This liquid has the advantage that it does not evaporate quickly. It also seems to increase the number of turns which the elastic will stand.

Regent's Park. ERIC B. PINDER DAVIS.

FERGUSON MONOPLANE.

[373] I am just about to make a spare pair of wings for my machines, and I should esteem it a great favour if you will give me some advice on whether I am making them the right size for my horse-power. A comparison of my machine with Blériot's "cross-Channel" type may be of some help to you.

BLÉRIOT.		MY MACHINE.	
Weight, complete, with aviator	715 lbs.	Weight, complete, with aviator	760 lbs.
Lifting surface (minus tail planes)	150 sq. ft.	Lifting surface ...	192 sq. ft.
h.p.	25	h.p.	35
Bore and stroke of engine	100 × 150	Bore and stroke of engine (8 cylinders) ...	85 × 95

I contemplate making the new wings with a third more lifting surface. This would give me about 292 sq. ft. The extra weight, I have worked out, owing to the different construction of the wings, will only be 40 lbs. Would I be better or worse off than I am now?

Could you give me any idea why the centre of pressure is so far back on the Antoinette machine. It must be very far back because the wheels are in the centre of the wings, and yet the machine falls down of its own accord if the aviator is not in the seat. When the aviator gets into position he is so far from the wheels the centre of gravity moves back a long way towards the back, thus making it necessary for the centre of pressure to be very far back also, as there is no lifting plane behind (?), and the machine flies perfectly horizontal.

I built my machine in the same way, and was very much surprised to find that I had to shift my wings back a good way before I could get the back end up properly.

You may be interested to know that out of twelve different makes of tractors I have not been able to get one satisfactory. This has kept me back very badly, but I have now one on order from Clarke and Co., of Kingston-on-Thames, and an "Integral," and hope soon to be able to report more satisfactory progress to you. From what my machine has done with poor type propellers I am quite certain of good results with properly-designed ones.

With apologies for troubling you.

Antrim. H. G. FERGUSON.

[It is extremely difficult to advise on the point raised about the supporting area. Any change will affect head-resistance and flight speed, therefore, also, the proportions of the "best" tractor-screw. For the engine-power, however, the increase in area at the expense of the *stated* increase in weight would possibly be an improvement. On the subject of the centre pressure, the point to be borne in mind is the disposition of the principal masses. The engine being right forward must be given a sufficient leverage to produce a couple that will balance the long tail about the pivot-line provided by the centre of pressure. The machine, as a whole, is supported as if upon a "knife-edge," and consequently an approximate balance of the masses must be established at once, so that the equilibrium (longitudinal) may be sensitive to the manipulation of the elevator.—ED.]

MR. CANDLER'S "MONOFOIL."

[374] I enclose a photograph taken a few weeks ago of a monofoil type of flying machine, which is in most respects similar to Blériot's cross-Channel flyer.

I do not think the weight exceeds 250 lbs. without motor, &c., whilst the supporting surface will be about the same number of square feet. It is to be named "The Stella." The foils which can be seen suspended from the joists above on both sides of the carriage each measure 18 ft. span by 6 ft. fore-aft, thus together allowing for rounded tips, say 210 sq. ft. They are built up with about 1,000 separate lengths of wood; the fabric used is a green oiled calico, which is perhaps a novelty as regards colour; each foil required over 2,000 short sprigs for fixing this, the adjuster plus the steering tails at each end of same is similarly covered. Its fore-aft dimension is 3 ft. and span 12 ft., giving an additional supporting area of 36 sq. ft.

The main spars of the carriage frame are hollow, all struts are pared to a cutting edge, thereby considerably reducing head resistance; every pains has been taken to gain efficiency in this way and all details have been carefully considered by the constructors—the Farnborough Aviation Works, Kent.

The body and foils suspended from the roof has nothing to do with the above, being a flying machine model now being constructed for Mr. C. H. M. A. Alderson. It is interesting to note that an old broken gliding machine, built entirely of cycle tubing brazed together, may be seen on the roof of the building. This was invented by Mr. Geo. Nichol, an enthusiastic experimenter, about 1900, and experimented with during the early years of this century. Each aerofoil had an elongated trail appendage; these were elevated or depressed alternately or together at the will of the operator, by means of levers worked from his cycle-saddle seat. Unfortunately, photographs of this machine in action were unobtainable, as the trial flights took place in the evenings after 7 p.m. I understand, however, a few photographs are in existence of its being put together on the field.

Mr. Thomas Moy, one of the best-known experimenters of the last century, constructed a small railway here, on which he conducted many scientific experiments bearing on wing machines. Records of these are, I believe, in the care of the proprietors of the Farnborough Aviation Works.

I hope to send you further photographs of the monofoil later.

H. A. W. CANDLER.

MODEL WOOD WANTED.

[375] Can any of your readers give me the name and address of anyone in Birmingham or district who will supply me with ¼ in. square strips (pine preferred), prepared for making a 4 ft. model. Wishing your paper every success.

Birmingham. A. WOOD.

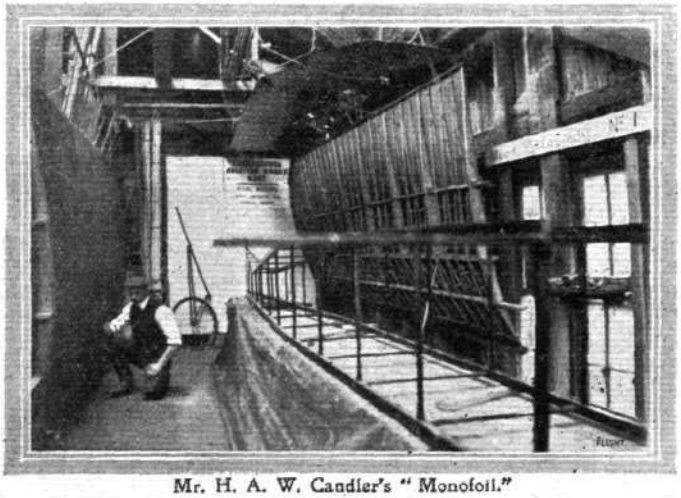
STREAM LINES.

[376] Very many thanks for ordering the anemometer for me. It is a very neat little machine, and will give a fairly correct idea of wind velocity when a steady wind blows.

There have been many discussions on the subject of air waves meeting curved planes, &c., and I should think this could be definitely decided by photography if anyone would take the matter up. The air waves made by bullets have been photographed by a special appliance, and the bullet was illuminated by an electric spark—Leyden jars of a capacity of 3,500 cm. were used. Of course, a model plane would not travel nearly so fast; on the other hand, it would require more light to illuminate a larger object, but I do not see why it could not be done. I thought of running a model plane into a jet of steam, and throwing a reflected light on the jet, which might do it. As a matter of fact, one can easily see what the air waves do by running a plane through steam against a reflected light, but it would be difficult to photograph; with a curved plane with what is called a dipping edge, driven through steam at an angle of about 10°, the air forms a vacuum behind the dip and follows the lower surface, going off in swirls over the top front edge. It would be interesting to know how the successful flying machines would balance if they were suspended from the centre of gravity. I do not know if I am quite wrong, but I imagine the weight forward of elevators, &c., should balance the pressure at a certain speed and angle of the main planes. Is this right? The Wright machine has all the weight in front. I am not considering the pilot and motor, which generally balance each other. Curtiss has apparently less weight forward, and so has to sit even in front of the main spar. The Farman, on the other hand, has a long heavy tail, and, in comparison, very little weight forward. Can you give me a formula for the proportion of this weight?

Carmoney. LILIAN E. BLAND.

[The investigation of stream line form by photography should be a fascinating branch of aerodynamic research, and we hope it may appeal to those who are prevented from following up the practical side of flight. It has already been studied to a certain extent in this country and also on the Continent. Lanchester has secured some photographs of smoke-laden atmosphere. Another interesting method is the investigation of stream line form in water by the use of a special powdered earth that remains suspended in the liquid and enables the stream lines to be followed with great facility.—ED.]



Mr. H. A. W. Candler's "Monofoil."

FLIGHT

FLYER EFFICIENCY.

[377] In calculating the efficiency of the various machines, both Mr. Evans and W. S. Flight fall into the same error of assuming that the smaller the area per lb. the more efficient the plane must be. No calculation can be of any value without taking into consideration the wing-angle.

Two machines of widely differing features as "Antoinette" and "Blériot XI" cannot be compared without knowing the wing-angles. The one has a large area and small angle, the other small area and large angle. Both systems have much for and against.

Again in Mr. Flight's table there are one or two figures given which are not taken on the same basis, and therefore the calculations are of little value. In the case of "Blériot XI," the weight, 715 lbs., is about her full load. Now to place Antoinette and Wright on the same footing another 350 and 200 lbs. should be added respectively, also in the same speed table Blériot's 45 was not under similar conditions to the Antoinette's 42; that the Antoinette is a much faster machine there is no doubt, and no one who has seen the two machines under the same conditions will deny. Then in calculating the area of the Blériot, another 30 square ft. (roughly) must be added to the 150 of the main wings, as the tail plane in this type has a lifting effect. Now all this makes a vast difference to the figures given as the efficiency of the several machines, and unless care is taken to place all machines on the same basis for calculation, some very misleading results are bound to be arrived at. The reason why Blériot comes out so well in the two tables in question is the value given to area, which alone means, practically, under this method of calculation, that two machines identical in every respect, save area—the one having a large area and small wing angle, the other a small area and large wing angle—the one having the large area would be hopelessly inefficient.

G. H. HANDASYDE.

BENDING BAMBOO.

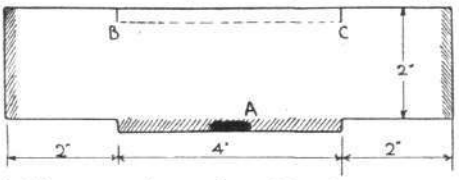
[378] Having seen no reply to the questions asked by Miss L. E. Bland (Letter No. 263) in the issue of January 1st, I beg to submit information as follows:—In cases where small bamboo is required, and the bending not severe, "dry" heat from a "spirit" lamp or stove would answer very well for any diameters from $\frac{3}{8}$ in. up to $\frac{3}{4}$ in., but not for anything larger; for diameters up to 1 in., 2 ins., or more, I should certainly use "wet" heat, or better still "steam," if possible, and even with dry heat it is a good plan to well soak the bamboo rods in very hot water before applying heat, and to keep wetting with same while bending. This is to prevent as far as possible "scorching" the fibres of the inside of bend, as if burnt they become very brittle, and would most likely crack through when left free. For rods of 1 in. and upwards for any bending beyond very slight curves it is better to bore holes through the middle of the "joints" if possible, continuing quite through several joints beyond the part to be bent, then carefully fill up each and every "cavity" with dry sand, tapping the part being filled repeatedly during the operation to ensure each "cavity" being quite full of the sand, but leave the very end cavity empty of sand, and pour in this one some warm water, watch till it disappears and continue to pour more water until quite sure "all the enclosed" sand is at least well damp, if quite wet all the better; put a cork "loosely" in open end, cover over with a bit of rag or canvas, and tie round to prevent its coming off; now immerse the whole portion to be bent in hot water, boiling if possible, and test the rod while doing this, till finding it begins to bend at that part more easily than any other. This may take any length of time from half-an-hour to three hours, according to size of rod; when ready, take from water and place over a wooden former of some kind about the proper curve required, I say about because, when cooled and dry, the bend is sure to "go back" a little, more or less, so it is better to bend to rather more curve than actually required when finished. The sand helps to retain the heat and also, what may, perhaps, be more important, it keeps the form or "section" of the bend almost, if not quite, its natural shape, and while allowing the outer fibres on top of bend to stretch, it prevents the inside fibres from buckling too severely upon each other and overlapping, the action being more compressive than "folding," besides avoiding much rupturing of these fibres in compression. The bent part should be firmly secured to the former or curved block till quite dry, sand and all, if possible, when sand will shake out, or can be easily withdrawn by inserting a long wire, and treat as though cleaning out a tobacco pipe with a bent stem. This may seem a long "job" on paper, but is easily and quickly accomplished if attention is given to each detail, and will give very satisfactory results to the merest amateur.

I shall be pleased to supplement any of above details if not found sufficiently clear to be easily followed.

Newport Pagnell. HY. BATH.

PAPER GLIDER.

[379] I thought this little glider might be of interest to you. If you cut this out of stiff notepaper, and weight it with sealing wax at A it will glide eight yards or more when started just from your hand. I have tried several gliders, but I find this one much the best. If you find this one does not rise enough put the front planes level, and cut out at B and C, and bind down on the dotted line.



The shaded parts are to be turned up. I have found that the longer the wings of these are the more steadily they fly (of course you must make the wings stiff). I should be very pleased if any of your readers could explain to me whether I am right or wrong in my ideas.

Granville Place, W. E. BURTON.

PAPER GLIDER RECORD.

[380] In answer to the question in FLIGHT of the 5th inst. as to the record flight of a paper glider, the longest I know of is a flight of nearly 90 ft. This flight was made nearly two months ago by a paper glider belonging to a certain Arthur Hope.

Rugby. HIRUNDO.

[381] In reply to "Sturnus" (333), I should like to give particulars of flights obtained by paper gliders of my own make:—

Glider (bird shaped), 6 ins. length in calm ... ... 62 ft.
" " " in breeze ... ... 75 ft.
" " " 3 ins. length ... ... 49 and 54 ft.

My longest glide was with a strip glider which measured 14 ins. by 2 ins., weighted at the nose with a small piece of lead; the distance travelled over level ground and thrown from the height of 6 ft. was 32 yards 1 ft. 9 ins. I don't know if this is a record; if not, I should be pleased to know of one better. According to experience, I consider that anything above 6 in 1 is good gliding—that is, the glider travelling 6 ft. to every 1 ft. of fall. However, I have never eclipsed "Sturnus's" glide with a glider made from a sheet of notepaper. Allow me to congratulate him.

Monton. AÉON.

[382] In reply to the question of "Sturnus" in a recent number, I have made a flight of 97 ft. with a paper glider (5 ins. across) in a still room, starting from 12 ft. above landing point. Also with a self-propelled paper model aeroplane ($3\frac{1}{2}$ ins. by $3\frac{1}{4}$ ins.) I have made a flight of 45 ft., starting from a point 7 ft. above the landing point (this is not counting any glide).

Bristol. A. H. PHILLIPS.

ANALYSIS OF MODERN FLYERS.

[383] The following method of arriving at a figure of merit may be of interest. In any design of aeroplane, the following relation holds good between horse-power, weight and area:—

$$HP^2 \propto \frac{W^3}{A} \quad \therefore \quad \frac{W^3}{A \times HP^2} = \text{constant.}$$

According to Mr. K. H. Evans' figures, this constant for an Antoinette = 1941, for Blériot = 1640. If the factors of safety were known to be identical in the two cases, and if the weights given were the maximum total weight which could be carried with the given HP and area, it would follow that with the same W and HP an Antoinette monoplane could fly with $\frac{1640}{1941}$ of the area of a Blériot. It would then be possible by comparing the necessary weight of the two designs to see which was the better.

In your issue of January 1st, Mr. Kenelm Edgcumbe rightly emphasises the importance of the minimum HP of flight, but the methods which he suggests for calculating the figure of merit are open to objection. By his first method (taking the ratio of weight lifted to propeller thrust) the figure of merit is not affected by such vital points as the overall efficiency of engine propeller and gearing (if any).

His second method (measuring the cotangent of the least gliding angle)—presumably the aeroplane is flying at full speed when the glide begins—is preferable, as the effect of this efficiency is felt in the initial velocity—that is, with an efficient engine and propeller the same velocity is attained with less weight and HP. This test might, however, in practice prove to be hardly accurate enough for exact comparisons.

The laws connecting HP, A, and V for various angles of attack in an aerocurve are quite different from those obtaining in the case of an aeroplane, and are beautifully and exhaustively studied (with diagrams) in an article in *The Engineer* for July 16th, 1909, which is well worth careful study.

The formula used above is obtained as follows:—

$$W = \text{lift} = \text{constant} \times AV^2 . \therefore V^2 \propto \frac{W}{A}$$

$$HP = \frac{F \times V}{375} \times F = 2k\sigma AV^2 \sin\alpha$$

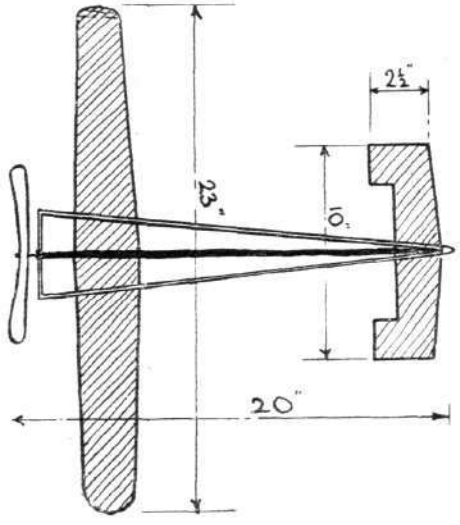
$$\therefore HP \propto AV^3$$

$$HP^2 \propto A^2V^6 \propto \frac{W^3}{A}$$

G. M. H.

MODEL MONOPLANE.

[384] I have been making a model monoplane, entirely of wood, except the motive power, which is elastic. I am sending you the



scale drawing of it which I thought might be of some use to your readers. Note the flexible steering tips on the front plane.

This model has flown all but 200 ft.

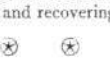
Hoping every success to FLIGHT. C. RIDLEY (age 15).

STEEL TUBING *V.* WOOD.

[385] I see most of the monoplane fusellages are made of wood. Is there any reason that you know of why these should not be made of light steel tubing?

Cambridge. H. S. WALTERS.

[There are some constructors who advocate tubular steel-work for the frames of flying machines, but the majority contend that wood is more suitable, regarding it as being stronger for the same weight as used in this class of construction. It is more easily worked, and less limited in respect to shape; it somewhat facilitates the attachment of other members and small parts, and, above all, it is capable of bending and recovering from strains.—ED.]



POINTS TO NOTE.

WE are advised the British Bariquand and Marre Engine Co. Ltd., are now in a position to supply the "B and M" aeroplane engine constructed to the order of Messrs. Wright Brothers. Delivery can be made within three or four weeks from date of order.

MESSRS. GOULD BROS., motor engineers, of Exeter, are, we learn, building to the order of a local enthusiast the chassis portion of a monoplane. This is to be fitted with a 3-cylinder Anzani engine and Cochrane propeller, both these being at present exhibited at their showrooms at London Inn Square, Exeter. Messrs. Gould have also secured the agency for Messrs. Handley Page, the well-known aeroplane constructors.

DIARY OF FORTHCOMING EVENTS.

British Events.

1910.		1910.	
Mar. 11–19	Flight Exhibition at Olympia.	Aug. 6–13	Flight Meeting, place not fixed.
July 11–17	Bournemouth Flight Meeting.		

Foreign Events.

1910.		1910.	
April 2–10	Biarritz.	July 14–24	Rheims to Brussels, cross country event.
April 3–10	Cannes.	July 24–Aug. 10	Belgium.
April 10–25	Nice.	Aug. 25–Sept. 4	Deauville.
May 10–16	Berlin.	Sept. 8–18	Bordeaux.
May 14–22	Lyons.	Sept. 24–Oct. 3	Milan.
May 20–30	Verona.	Oct. 18–25	America. Gordon-Bennett Balloon Race.
June 5–12	Vichy.	Oct. 25–Nov. 2	America. Gordon-Bennett Aeroplane Race.
June 5–15	Budapest.		
June 18–24	St. Petersburg		
June 26–July 10	Rheims.		

Aeronautical Patents Published.

Applied for in 1909.

Published February 24th, 1910.

2,540. R. P. ELWORTHY. Aerial machines.
3,908. D. F. ROURKE. Airships, aeroplanes, &c.
5,699. H. A. FRANKLIN AND OTHERS. Aeroplanes.
10,764. A. H. Nicholson. Flying machines.
11,153. A. J. FREDRIKSON. Airships.
21,922. E. J. J. SALMSON AND P. E. AIME. Flying machines.
22,176. W. BRIERLEY. Airships.
26,138. C. J. BERTHEL. Airships.

BACK NUMBERS OF "FLIGHT."

SEVERAL back numbers are now very scarce, and have been raised in price as follows:—

				s.	d.
No. 2, Jan.	9,	*containing*	Table of Propellers	1	6
3 ,, 16	,,	,,	Engines	3	0
4 ,, 23	,,		Engines at Paris Salon ..	3	6
6, Feb. 6	,,		"How Men Fly"	1	0
			Aeronautical Bibliography.		
			Wright Bros.' Elevator Patents.		
8 ,, 20	,,		Flying Ground at Fambridge	1	0
			Illustrated Glossary.		
10, Mar. 6	,,		Human Side of Flying ...	1	0
			Aero Club Ground at Shellbeach.		
			Military Aeronautics.		
12 ,, 20	,,		Souvenir Supplement ...	1	6
15, Apr. 10	,,		Engines at Olympia	1	0
16 ,, 17	,,		Prize List	3	6
			Models at Olympia.		
31, July 31	,,		Blériot Flyer	2	0
			(Full page drawing.)		

Other back numbers, post free, 1½*d.* each (including descriptions and scale drawings of the Voisin, Curtiss, Cody and Farman biplanes, the Santos Dumont, Antoinette, and Grade monoplanes, and of a full-size Wright glider.

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